

Belgian Heating System Design

1. Determine the desired average working temperature of the room. In general:
 - a. Bathroom: 22-24 Celsius
 - b. Bedroom: 15-18
 - c. Kitchen: 15-18
 - d. Hallway/foyer: 15-18
 - e. Living room: 20-21
2. Calculate the volume of the room.
3. Select the outside temperature to design for. Normally –5 Celsius.
4. Determine heat loss rate for the room in question. Using the outside temperature (selected in step 3) and material manufacturer's heat loss factors for various materials. In general, calculate the surface area of different materials for each wall, the floor, and the ceiling. Determine the heat loss constant for each. Include in calculations insulating factors, whether the surface is an interior or exterior surface. If the surface is interior, include the anticipated temperature of the opposite room. If the surface is exterior, determine the impact of sun, wind, water, etc. Include ventilation flow – how much air is exchanged over how long a period of time. For more detailed discussion, visit <http://www.plumbingpages.com/featurepages/Heatloss.cfm>
5. Determine the surface area of radiator required to maintain a specific volume (calculated in step 2) at a specific temperature (selected in step 1) given a heat loss rate (calculated in step 4).

Use radiator manufacturer's technical guidance; different makes and models of radiators emit different amounts of heat over different periods of time.
6. Select the furnace needed to power the radiator system.

Notes for Americans:

1. Step 1 – most US people tend to want their rooms warmer than the selected design temperature. Right from the start you are operating at a disadvantage; this is like trying to drive your Yugo at 85mph; maybe it will work, but it's not good for the long-term.
2. Volume of the room – this assumes the room is a closed area. If you leave your interior doors open, this calculation is false. Therefore the size and location of the radiators is insufficient.
3. Outside temperature – in general, it is not often –5. But there is no telling what temperature was actually selected in 1936 when your house was being built.
4. Heat loss will be SEVERELY affected by open doors!

5. Final two steps – select the size, shape, locations of radiators and furnace. After completing the theoretical calculations, your house builder had to apply reality. Frequently, the number and size of radiators might not fit on the wall space available. Or the slightly-less-expensive model of radiator or furnace fit his budget a little better. Or he changed the design temperatures a little and decided to wear a sweater inside and hope it was a little warmer outside.

6. All these factors put together mean the average American is trying to heat his entire house to a higher temperature than the system was built for. That costs extra money and extra strain on the system, resulting in more frequent failures.

Bottom line – keep your inside doors closed! Get the annual maintenance done in September!